NUCLEAR PLANT DUST CONTROL

The Indian Point Post Shutdown Decommissioning Activities Report (PSDAR) contains little mention of dust control and those discussions are based nearly entirely on the NRC's Decommissioning Generic Environmental Impact Statement (GEIS):

> *Federal, state, county and local regulations pertaining to air quality will remain in effect to regulate emissions associated with fugitive dust, criteria air pollutants, hazardous air pollutants, and ozone depleting gases.* [color added for emphasis]
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> *The GEIS concluded that air quality impacts associated with decommissioning are small. The SEIS, Vol. 1 (Reference 15) found that there would be no impacts on air quality associated with IPEC decommissioning beyond those discussed in the GEIS.*[1]
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> and
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> *Indirect impacts may result from effects such as erosional runoff, dust or noise. Any construction activities that would disturb one acre or greater of soil would be subject to the requirements of the existing SPDES permit, or a new stormwater permit from the NYSDEC, prior to proceeding with the activity. The permits would contain BMPs to control sediment and the effects of erosion associated with the construction activity. Fugitive dust emissions will be controlled through the judicial use of water spraying.*[2]

The NRC's GEIS, issued in November 2002, contained the agency's assumptions and expectations for decommissioning activities:

> *The nonradiological impacts, occurring both during the decommissioning period (e.g., noise, dust, land disturbance), and the long-term impacts occurring after the decommissioning activities are completed (e.g., concrete leaching into the groundwater) can be evaluated generically and are included in the evaluation of each of the applicable environmental issues in Chapter 4 of this document.*[3]
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> and
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> *Waste systems (gaseous, liquid, solid, and nonradioactive): The gaseous waste management system in an operating nuclear facility collects fission products, mainly noble gases, that accumulate in the primary coolant. It is designed to reduce the radioactive material in gaseous waste before discharge to meet the dose design objectives in 10 CFR Part 50, Appendix I. During decommissioning, the gaseous waste management system is used during the decontamination and dismantlement of certain tanks or pipes. It is also used during dismantlement to assist in the control of radioactive dust or loose contamination. In addition, high-efficiency particulate air (HEPA) filters are used to remove radioactive material on a localized basis. For example, when removing concrete with a power hammer or drill in the containment building, a temporary plastic tent equipped with a HEPA filter, prevents contaminated dust particles from entering the building. A second set of HEPA filters is located on the exhaust vent pathway for the building. The quantities of gaseous effluents released from operating plants and those in the decommissioning process are controlled by the administrative limits that are defined in the Offsite Dose Calculation Manual (ODCM) or similar document, which is specific for each plant. The limits in the ODCM are designed to provide reasonable assurance that radioactive material discharged in gaseous effluents are not in excess of the limits specified in 10 CFR Part 20, Appendix B, thereby limiting the exposure of a member of the public in an unrestricted area.*[4]

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[11] Holtec International, Indian Point Nuclear Generating Units 1, 2 and 3 Post Shutdown Decommissioning Activities Report, December 19, 2019, page 23. (ML19354A698)
[2] Ibid page 24.
[3] Nuclear Regulatory Commission, Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1, NUREG-0586 Vol. 1, November 2002, page 1-8. (ML023470304)
[4] Ibid page 3-10

Movement and open storage of material onsite: Movement of equipment and open storage of materials onsite during decommissioning are similar to activities during construction or demolition of an industrial facility. The air-quality impacts of the movement of equipment an open storage of materials onsite are primarily associated with fugitive dust. Movement of equipment outside of the buildings may generate fugitive dust. Movement of equipment may also alter the size distribution of particles on the ground, making the particles more susceptible to suspension by the wind. Mitigation measures will be taken to minimize dust to comply with local air-quality regulations. Common mitigation measures include watering and other soil stabilization measures, such as spraying sealants on the area and seeding. Therefore, it is unlikely that the movement of equipment and open storage of materials will be detectable or destabilize regional air quality.[5]

Demolition of buildings and structures: Once decontamination has been completed, the demolition of buildings and other structures at a nuclear power plant is similar to demolition of buildings and structures at industrial facilities. Demolition of buildings and major structures may cause a temporary increase in fugitive dust from the site. Fugitive dust from demolition of buildings and structures will involve large particles that will settle to the ground quickly. Demolition will generally be limited to a small number of short-duration events. Mitigation measures will be-used to minimize dust. Therefore, it is unlikely that the fugitive dust from demolition of buildings and structures will be detectable or destabilize air quality.[6]

and

Licensees are expected to use best-management practices (BMPs) to control many of the potentially adverse impacts of decommissioning activities on aesthetics (e.g., dust and noise), as discussed in other sections.[7]

Volume 2 of the NRC's GEIS contained the agency's responses to comments on the draft GEIS including a comment specifically about tenting:

***Comment**: Page 4-14, Section 4.3.4.2, Lines 26-33. The Supplement states that fugitive dust emissions during movement of equipment outside of facility buildings are "likely ... to be confined to the immediate vicinity of the equipment," "in general ... limited to a small number of events" and "of relatively short duration." Again, is the reader to assume that a licensee must perform a site-specific analysis of potential air quality impacts where one of these conditions is not met? Also, how are "immediate", "small number of events" and "relatively short duration" defined? Further, must the facility employ mitigation measures to minimize dust; if so, where are these specified? (**CL-16/41**)*

***Comment**: Page 4-14, Section 4.3.4.2, Lines 40-43 -and Page 4-15, Section 4.3.4.2, Lines 1-2. The Supplement states that there is an average of less than one shipment per day of low-level waste (LLW) from a decommissioning plant; that, "in most cases, the number of shipments of other materials to and from a decommissioning facility will be less than that for LLW;" and that therefore emissions associated with the transportation of materials from such a plant "are not expected to have a significant impact on air quality." Again, is the reader to assume that a licensee must perform a site-specific analysis of potential air quality impacts if the number of shipments of materials to or from its decommissioning facility will exceed the level of less than one shipment per day? (**CL-16/42**)*

[5] Ibid page 4-18
[6] Ibid page 4-18
[7] Ibid page 4-72

***Response**: Section 4.3.4 was revised to address the above comments and to provide a better explanation of the process and the terminology. The experience to date at plants undergoing decommissioning has not resulted in air quality issues related to fugitive dust. Furthermore, the licensee must evaluate impacts resulting from decommissioning activities against previously issued environment assessments (10 CFR 50.82 (a)(b)(ii). If the evaluation determines that the impacts are greater that previously assessed then the impact is outside the envelope established by this GEIS.*[8]

and

Comment**: This is of special significance if explosives are to be used for demolition, which will generate radioactive fugitive dust. **(CL-51/9)

***Response**: Control measures will be required during demolition to keep releases, including those associated with fugitive dust, within regulatory limits regardless of the methods used during demolition. The NRC license will not be terminated until the residual radioactivity at the site is below regulatory limits. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*[9]

and

Comment**: The area being worked in should be covered to contain dust if it means covering the whole site with a tent with an adhesive inner surface to capture particulates. **(CL-20/33)

***Response**: The use of enclosures (such as plastic "tents") during decommissioning to contain airborne contamination is a common practice. However, the enclosures are limited in size to the area that is being worked on in order to contain contamination and not allow it to drift to areas that are not contaminated. Covering the whole site with a tent would not be an appropriate or realistically feasible method of containing contamination. In addition, the specification of methods to use during decommissioning is not within the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*[10] [color added for emphasis]

The decommissioning plans for the West Valley Demonstration Project, site of a former nuclear fuel reprocessing facility in New York, also includes dust control/air quality measures:

Dust can enter the body via inhalation and cause acute injury to the lungs, eyes, and mucous membranes. Chronic damage to the lungs can also result when toxic compounds are present in dust. Water spraying or other approved dust control methods shall be used as necessary to suppress dust emissions to the lowest practicable level. Excessive visible emissions of particulates shall not be permitted. Dust emissions will be reduced by minimizing drop heights when handling dusty materials, e.g. emptying bags of concrete or mortar or dropping materials onto dusty surfaces. The work control package shall outline the use of dust suppression methods where dust producing activities are expected and the AHA shall list a specific dust suppression method as a hazard control.[11]

and

The MPPB [Main Plant Process Building] *demolition WIP(s) will identify the final, approved, specific sequence of demolition activities, including detailed means and methods and controlled*

[8] Nuclear Regulatory Commission, Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1, NUREG-0586 Vol. 2, November 2002, pages O-41 to O-42. (ML023500187)
[9] Ibid page O-43
[10] Ibid page O-74
[11] U.S. Department of Energy Health and Safety Plan for West Valley Demonstration Project Environmental Characterization Services, February 2012, section 4.12. (ML12194A595)

demolition techniques consistent with the final approved calculation for open air demolition. The demolition WIP will also include a radiological monitoring plan to identify methods for monitoring the perimeter of the work area and personnel working within the area, environmental controls to mitigate potential releases, waste management practices, and safety and health processes to ensure worker safety. These items are discussed further below.

Some of the techniques and approaches to be used include development of detailed demolition drawings/sketches identifying the specific sequence of events, continuous air monitoring, control and disposition of wastewater, use of suppressants on demolition debris to prevent dispersion of particulates and/or contamination, timely loading and disposition of debris to prevent accumulation, and restricting access to the area to prevent unauthorized entry during demolition activities. Suppression of airborne contamination during demolition will be through the application of fixatives to contaminated building surfaces and the use of water fogging nozzles/misting equipment (standalone or equipment mounted), which may include dust control products, to suppress dust during demolition. Debris piles will be sprayed with a suppressant at the end of each day or more frequently.[12]

In 2018, the NRC visited West Valley to evaluate decommissioning activities and noted the dust control measures:

Building demolition is being performed using heavy construction equipment that use large impact hammers to bring down the concrete walls and shears and claws to bring down less robust features and size-reduce debris to fit into the 30 yd^3 intermodal shipping containers. Water sprays are directed onto demolition areas and waste piles for dust control and to limit the potential for airborne activity releases. DOE has incorporated lessons learned from prior decommissioning activities through the use of water spray equipment that uses more focused spray equipment that uses less water, but is still effective in dust control. Residual water is collected in bermed areas and pumped as needed into collection tanks for subsequent analysis. Debris piles are also coated and mixed with a fixative agent for additional dust control.

DOE and contractor staff indicated that during the very cold and inclement winter months, demolition activities have been adversely impacted by freezing of water sprays and equipment issues due to the cold temperatures. The NRC representatives noted that potassium acetate, an aircraft deicing agent, has been added to water sprays to control freezing and electric heaters used to maintain equipment operability in the lower temperatures. WVDP staff indicated that an evaluation of the effects of potassium acetate was completed and no adverse effects were expected.[13]

The Environmental Report for the Combined Operating License Application for a third reactor at the Nine Mile Point nuclear plant in New York covered dust control measures during its construction:

Construction activities will result in increased air emissions. Fugitive dust and fine particulate matter will be generated during earth moving and material handling activities. Vehicles and engine-driven equipment (e.g., generators and compressors) will generate combustion product emissions such as carbon monoxide, oxides of nitrogen, and to a lesser extent, sulfur dioxides. Painting, coating and similar operations will also generate emissions from the use of volatile organic compounds (VOCs).

[12] West Valley Demonstration Project Main Plant Process Building (MPPB) Decommissioning & Demolition (D&D) Plan, September 5, 2019, section 6.1. (ML19267A215)
[13] NRC Monitoring Visit Report West Valley Demonstration Project, June 7, 2018, enclosure pages 1-2. (ML18162A286)

> *To limit and mitigate releases, emission-specific strategies, plans and measures will be developed and implemented to ensure compliance within the applicable regulatory limits defined by the primary and secondary National Ambient Air Quality Standards in 40 CFR 50 (CFR, 2007c) and the National Emission Standards for Hazardous Air Pollutants in 40 CFR 61 (CFR, 2007d). Air quality and release permits and operating certificates will be secured where required.*
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> *For example, a dust control program will be incorporated into the Storm Water Pollution Prevention Plan. A routine vehicle and equipment inspection and maintenance program will be established to minimize air pollution emissions. Emissions will be monitored in locations where air emissions could exceed limits (e.g. the concrete batch plant)*.[14] [color added for emphasis]

The decommissioning of the Humboldt Bay included a zero-emission requirement for dust:

> *A significant challenge to the project is the requirement for dust control, especially for concrete scabbling or shaving of radiologically contaminated surfaces. For example, demolition of the LRWB required extensive decontamination of the interior concrete wall and floor surfaces. There was a zero-emission requirement for fugitive contaminated dust. The LRWB connection to the main plant exhaust system was removed, and local HEPA filtration units were used to capture dust. Water sprays were used to knock down the concrete, silica-laden dust, but effectively applying and adjusting this control process was labor intensive. This example is discussed in more detail in Section 2.2.2.6. This was a significant impediment to a sustained pace of demolition work and could not have been accurately predicted*.[15] [color added for emphasis]

The dust control measures in the Indian Point PSDAR are similar to the scope and level of detail of dust control measures in the Combined Operating License Applications for several proposed nuclear power plants in other states:

> Fermi (MI): *The State of Michigan has adopted regulatory code that provides typical control methods of fugitive emissions including dust.*
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> and
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> *It is likely that the onsite concrete batch plant may create the largest amount of dust. However, the plant will be equipped with a dust-control system that would be checked and maintained on a routine basis, and offsite impacts should be negligible*.[16]

> V. C. Summer (SC): *Procedure sections would describe the techniques that would be used to minimize the generation of fugitive dust from construction activities and reduce the release of emissions from construction equipment and vehicles. Fugitive dust control measures such as watering of roads, covering truck loads and material stockpiles, reducing materials handling activities, and limiting vehicle speed are typically required. Visual inspection of emission control equipment is also a common requirement*.[17]

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[14] Nine Mile Point Unit 3 Environmental Report, Chapter 4 – Environmental Impacts of Construction, 2008, section 4.4.1.3, Dust and Other Air Emissions. (ML092800692)
[15] Humboldt Bay NRC Decommissioning Funding Status Report, 2016, section 3.2.18, Dust Control. (ML16098A021)
[16] Fermi 3 Combined License Application, Part 3: Environmental Report, Chapter 4 – Environmental Impacts of Construction, September 2008, section 4.4.1.3, Dust. (ML082730652)
[17] V. C. Summer Units 2 and 3 COL Application Part 3 – Environmental Report, 2010, section 4.6.2.2, Air Quality (Fugitive and Vehicular Emissions). (ML101930224)

Comanche Peak (TX): *Air quality protection procedures would describe the techniques that would be used to minimize the generation of fugitive dust from construction activities and reduce the release of emissions from construction equipment and vehicles. Fugitive dust control measures such as watering of roads, covering truck loads and material stockpiles, reducing materials handling activities, and limiting vehicle speed are typically required. Visual inspection of emission control equipment is also a common requirement*.[18]

South Texas Project (TX): *Air quality protection procedures will describe the techniques that would be used to minimize the generation of fugitive dust from construction activities and reduce the release of emissions from construction equipment and vehicles. Fugitive dust control measures such as watering of roads, covering truck loads and material stockpiles, reducing materials handling activities, and limiting vehicle speed are typically required. Visual inspection of emission control equipment is also a common requirement*.[19]

Summary and Conclusions

The Indian Point PSDAR explicitly stated that federal, state and local regulations remain in place to ensure air quality during decommissioning. The NRC's GEIS for decommissioning explicitly discussed tenting as one of many methods of controlling emissions to comply with appropriate regulations.

The decommissioning of the West Valley nuclear facility in New York and Humboldt Bay nuclear plant in California show the implementation of dust control measures as well as NRC monitoring thereof.

The plans for dust control at Indian Point are consistent with regulatory requirements and industry practice. There is no apparent deficiency that needs correction.

However, it would enhance public awareness of the requirements and practices to ask Holtec to describe the various dust control measures they intend to utilize and to ask the NRC the oversight efforts they plan to apply to ensure compliance with emissions regulations. These recommended "asks" are not to imply that the plans are deficient; rather, to elaborate on existing policies and practices to increase the public's understanding of dust control during decommissioning.

[18] Comanche Peak Nuclear Power Plant Units 3 and 4 COL Application, Part 3 – Environmental Report, 2013. Section 3.9.2, Air Quality (Fugitive and Vehicular Emissions). (ML13345A636)

[19] South Texas Project Units 3 and 4 COL Application, Part 3 – Environmental Report, 2014, section 3.9S.2.2, Air Quality (Fugitive and Vehicular Emissions). (ML14307B552)